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Spaceport News

John F. Kennedy Space Center - America's gateway to the universe

INSIDE . . .

Atlantis leaves OPF for final time

By Rebecca Regan
Spaceport News

CLICK ON PHOTO *NASA/Jack Pfaller*

Shuttle Atlantis makes its final planned move from Orbiter Processing Facility-1 to the Vehicle Assembly Building at Kennedy Space Center. Atlantis will roll out next week. To find out more about roll outs, click on the photo.

If home is where the heart is, then the heart and soul of NASA's space shuttle fleet reside in three custom-built, 29,000-square-foot facilities at Kennedy Space Center. They're called orbiter processing facilities, OPFs, bays, or hangars, and inside highly experienced technicians perform two-thirds of the work to prepare a shuttle for space.

On May 17, those technicians said farewell as shuttle Atlantis ventured out of its home in Orbiter Processing Facility-1 for its last rollover move to the Vehicle Assembly Building. Most agreed it felt like sending their son or daughter off to college. Hundreds of other space center workers and even the crew that will fly the shuttle to the International Space Station this summer stopped by to witness the short, yet historic, journey.

"It was my first time seeing an orbiter roll out of the OPF, so it was an incredible experience to see it pulled away from the structures and to see the whole orbiter up close and without the scaffolding around it," said STS-135 Mission Specialist Rex Walheim.

Joining Walheim on the STS-135 mission will be Commander Chris Ferguson, Pilot Doug Hurley and Mission Specialist Sandy Magnus.

Atlantis' turnaround operation began in May 2010 when, fresh off the blacktop of Kennedy's Shuttle Landing Facility and back from the STS-132 mission, it was towed to OPF-1. Once inside, technicians jacked-and-leveled the shuttle to maintenance height where platforms surrounded the spacecraft like a glove.

"Each bay has a footprint of the orbiter, and when it rolls in, it has to fit to that footprint," said Wayne Bingham, a United Space Alliance, or USA, flow manager. "We try to keep the platforms within a maximum distance of 6 to 8 inches, but a minimum of 4 inches."

Bingham began working at Kennedy in the late 70s to prepare shuttle Columbia for its first flight, STS-1, and said the day-to-day operations in an OPF are like working in a garage. During the first couple of days technicians perform hazardous commodity offloads, dry the engines and open the door panels to gain access. Then, they remove the previous mission's payload. Next, it's on to about three month's worth of work to check the heat shield tiles, change the space shuttle main engines, or SSMEs, and assess the vehicle's structural, mechanical and electrical integrity.

Dan Johnson, Atlantis' senior vehicle engineer with USA, said sometimes they even have to troubleshoot issues or replace crucial sys-

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T-38s intregal part of successful shuttle landing

By Steven Siceloff
Spaceport News

Years before the space shuttle would glide home to a safe touchdown on runways in California and Florida, astronauts pitched the noses of T-38 jet trainers toward the same runways to find out what it would look like to land a shuttle in such a way.

More than 30 years after that first T-38 approach, space shuttle Endeavour will perform the same technique June 1 with Commander Mark Kelly and Pilot Greg H. Johnson at the controls. The first landing opportunity for STS-134 comes at 2:32 a.m. EDT.

Like astronauts throughout NASA's history, they kept up their flying skills in the cockpit of T-38s.

The T-38 remains a fixture for astronaut training because the sleek, white jets make pilots and mission specialists think quickly in changing situations, mental experiences the astronauts say are critical to practicing for the rigors of spaceflight.

"It's actually our most important training that we do as astronauts," said Terry Virts, who flew as the pilot of STS-130 aboard shuttle Endeavour. "It's the one place where we're not in a simulator. It's real flying and if you make a mistake, you can get hurt or break something or run out of gas. There are a lot of things that happen real-world in a T-38 that don't happen in the simulator."

"You're in a different world, a dynamic world, it doesn't matter whether it's a shuttle or a T-38," said Story Musgrave, a six-time shuttle flier who posted thousands of hours in the T-38 and

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Students to design tiny satellite for future LSP mission

By Linda Herridge
Spaceport News

A group of 12 students from Merritt Island High School are participating in Kennedy Space Center's Creating Understanding and Broadening Education through Satellite (CUBES) pilot project. One day soon they may see the tiny satellite they design, called a CubeSat, fly as a secondary payload with a university satellite on one of NASA's expendable launch vehicle missions.

The CUBES project, developed and implemented by Kennedy's Foundations of Leadership Team, is spearheaded by the center's Education Programs Office. The Launch Services Program (LSP) is sponsoring the project and providing the CubeSat kits and additional support material.

Merritt Island is only the second high school in the country, and the first in Florida, to design and build a CubeSat.

Danielle George, an incoming senior and CUBES project manager, said she heard about the project through the school's science club and wanted to get involved because it was truly an opportunity of a lifetime.

"I've lived next to the space center my entire life so it is a dream come true to be able to partner with engineers to design, construct and launch a satellite," George said.

Erin McCaskey, also an incoming senior said she heard about the project through the school's engineering club, as did many of the other students who signed up. McCaskey readied the preliminary system requirements for review.

CLICK ON PHOTO *For NASA*

NASA and industry representatives listen as students from Merritt Island High School present a mission concept review and preliminary systems requirements review for Kennedy Space Center's Creating Understanding and Broadening Education through Satellite (CUBES) pilot project last month. To find out more about the Cubesat Launch Inniative, click on the photo.

"I really wanted to get involved because it seemed like something unique and different than anything else at the school," McCaskey said. "I knew it would be a great learning experience."

Kennedy mentor Shaun Daly from the Engineering Directorate, is the programmatic manager and liaison to the LSP. He said the mentors are equally excited about the potential to be involved in the development of a CubeSat.

"We hold ourselves to a promise that the students run this project," Daly said. "We will continue to enable learning while giving guidance where needed, but the students make the end decisions."

After completing the first major milestones, which were delivering a mission concept review and preliminary systems requirements review to NASA and industry personnel in late April, the students received approval to continue on to the design phase.

George said the reviews included an overview of the mission and how the team plans to achieve it. She and other students talked about each subsystem, including power, communication, command and data and the requirements needed for each.

"The CubeSat is a tool to educate," said Garrett Skrobot, who is the LSP PPOD/CubeSat mission manager. "It is a way to encourage high school students to get excited about science, technology, engineering and mathematics (STEM) careers."

Grace Johnson, the CUBES education project manager, said that the tiny satellite's primary mission will be to collect vibration data during the launch, which is one of LSP's goals. The data will be transmitted wirelessly to the university satellite also on the mission, and then from there to Earth.

"This is potentially the beginning of a series of missions that could support that effort," Johnson said. "It's also a way to show that high school students can design and build a small satellite."

George said that LSP requirements need to be changed in order to allow the CubeSat to be powered on during launch for data transmission. Normally, secondary payloads must be powered off so they don't interfere with the primary satellite during launch.

According to Alison Fertig, a physics teacher and project advisor, the students will meet during the summer to redefine requirements and work on their trades. She hopes the students will be able to travel to Utah State University at the beginning of August for the Small Satellite Conference and a CubeSat workshop facilitated by California Polytechnic University.

Daly and several other mentors are exceptionally proud of the work the students already accomplished and also are impressed with the innovative solutions they developed to meet tough engineering challenges in the beginning design phase of the project.

"There is much to come," Daly said. "We expect great things from the students and I am sure they will deliver in a big way."

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tems. For example, Atlantis recently had an issue with its external fuel tank actuator, which is a mechanism that retracts back into the shuttle after the tank separates in orbit.

"This needed to be coordinated with a couple different engineering systems teams, as well as with our NASA customer, the chief engineering office and with flow management," said Johnson.

Those teams got together, resolved the issue and continued routine processing, but not without informing the astronauts who will be strapped into the spacecraft traveling about 17,500 mph in space in a few months.

"We try to keep them tied in, or just communicate the problems that we've had and it's just a way to maintain rapport," said Johnson. "Especially if it was an in-flight anomaly (IFA) from a previous mission . . . they know we addressed it and she's ready to fly."

"They are all so detail oriented and so meticulous and precise and they won't let something go that's substandard," said Walheim.

That implicit trust could stem from the personal relationship each OPF worker develops with their shuttle.

"You actually walk around sometimes and talk to it. You know, 'You've got to be good today, you can't break, you've got to do this test, we've got to do it on time, so you've got to perform,'" Bingham said. "People look at you who are outside the business and think you're crazy. But in reality, it's just the niche that you develop with the spacecraft."

The work that took place in OPF-1 was only a stepping stone toward more processing for the Space Shuttle Program's final flight. On May 18, Atlantis was attached to its tank and solid rocket boosters atop a mobile launcher platform. On May 31 at 8 p.m., Atlantis is scheduled to roll out to Launch Pad 39A. Launch teams also are targeting a tanking test for June 15, and the STS-135 crew is scheduled to be back at Kennedy on June 20 to run through a full launch dress rehearsal called the Terminal Countdown Demonstration Test.

"Folks don't come to KSC to work on the shuttle to get rich. They come because of the space program. They love being part of something bigger than an individual, being part of a great team," Hurley said. "I have the utmost confidence that all the i's are dotted all the t's are crossed and Atlantis will be ready to go."

Aquarius to search salty seas for climate clues

By Steven Siceloff
Spaceport News

NASA's Aquarius/SAC-D mission is to cast a specialized eye on the world's ocean basins and seas to find out what salinity can tell us about the future of Earth's climate.

The Aquarius instrument is NASA's contribution to the international mission scheduled to launch June 9 from Vandenberg Air Force Base, Calif., aboard a Delta II rocket. The Argentine Space Agency, CONAE, supplied the spacecraft that Aquarius and instruments from other nations are connected to.

"Ocean salinity is one of the parameters that has never been measured before," said Yi Chao, project scientist for Aquarius. "NASA satellites have been measuring a number of different ocean parameters like temperature, sea level, the wind, the ocean color, productivity. But ocean salinity has never been measured from space."

Such a detailed measurement is unprecedented.

"Most of the surface salinity measurements that currently exists has been taken from boats or buoys that are placed around the ocean, but to get complete global coverage of sea surface salinity, I mean, you've got to do it from space," said Armando Piloto, mission manager for Aquarius.

NASA's Launch Services Program, based at Kennedy Space Center, is managing the launch.

"The Delta's been one of our most reliable vehicles by far," said Omar Baez, launch director for Aquarius. "We have not had a single mishap or failure on the Delta 2 in LSP's history. There have been failures, some of the other guys have experienced failures in that vehicle years ago, but the vehicle is robust."

The mission is launching from California because it will go to a polar orbit allowing the instruments to survey all the world's surface.

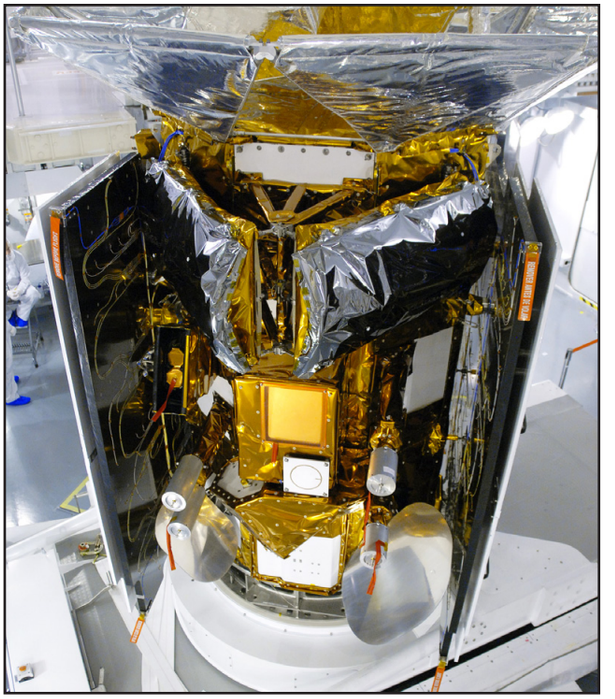
"Close to 25 or 30 percent of the surface of the ocean has never even been observed," said Gary Lagerloef, principle investigator for the mission. "In other words, we have no salinity samples at all from parts of the world, particularly in the southern hemisphere and the south Pacific and south Atlantic and southern Indian Ocean, so there's a big data gap."

NASA and Argentine officials have worked closely before and are applying that working relationship to the Aquarius effort.

"This is actually the fourth time that NASA and CONAE partnered on a science mission," Piloto said. "I've had the opportunity to work on the previous mission, SAC-D, which launched out of Vandenberg on a Delta II. And I truly enjoyed the experience of working with the Argentines."

The Aquarius instrument is scheduled to collect data for three years to give the most complete look yet at ocean surface salinity. Scientists hope the information will point out trends in climate change and the water cycle on the planet.

"Variations in the water cycle on a large scale mean changes in climate from wet to dry, from moist years to rainy years to dry seasons and to droughts," Lagerloef said. "They affect agriculture, they affect water supply for our water systems, for all the uses that we have, agriculture and everything else, so to understand climate change in the future, it's really important to understand what global warming, for example, is going to do to those rainfall patterns and drought patterns."



CLICK ON PHOTO *NASA*

NASA's Aquarius/SAC-D spacecraft is rotated for the final time into a vertical position prior to its installation into a transportation canister in Space Systems International's Payload Processing Facility at Vandenberg Air Force Base in California. Following delivery to the launch pad, the spacecraft will be integrated to a United Launch Alliance Delta II rocket in preparation for the targeted June liftoff. Aquarius, the NASA-built primary instrument on the SAC-D spacecraft, will provide new insights into how variations in ocean surface salinity relate to fundamental climate processes on its three-year mission. To find out more about the Aquarius mission, click on the photo.

From **LANDING**, Page 1

instructed others how to fly it, too. "It's understanding the rules, how to live within the rules."

Powered by two afterburning General Electric J85 engines, a T-38 can reach Mach 2 and soar above 40,000 feet, about 10,000 feet higher than airliners cruise. The plane can wrench its pilots through more than 7 Gs, or seven times the force of gravity. That's enough to make simply lifting hands a feat of strength and breathing a labored chore. It'll make one's neck feel like it is balancing a cinder block. It's also more than enough to make the average person black out.

"The T-38 is a great aircraft for what we need at NASA because it's fast, it's high-performance and it's simple," Virts said. "It's safe and it's known. So compared to other airplanes, it's one of the best."

Anyone who didn't fly a T-38 before they got to NASA learned to fly it once they joined the astronaut corps. Basic astronaut training includes T-38 courses, and mission specialists, who do not sit at the controls of a space shuttle, have to record four hours a month at the stick of a T-38. Commanders and pilots are required to fly the T-38 for 15 hours a month.

Joining the agency in 1967, Musgrave would take the planes on checkout flights to make sure a jet could handle the demanding requirements of flying at the hands of test pilots.

"It's the best flying to me because you do absolutely everything the airplane can do," Musgrave said. "That's very good flying."

The T-38 is hailed by the astronauts for its simplicity, safety and reliability. It has surprised its pilots on a few occasions, though.

One of Musgrave's experiences came during a T-38 check flight when the aircraft was supposed to hold itself level in a stall, which is when the wings are no longer providing lift. In Musgrave's case, the aircraft rolled over onto its back.

Musgrave released the control stick and let the jet flop around in the air and sort itself out until it pointed its nose down and once again became flyable. He performed the same test in the same jet with the same results repeatedly after the mechanics could not find out what was wrong.

He took the same plane out again years later and it passed the stall test completely.

Musgrave describes the T-38 as "a classic, timeless beauty."

"If you didn't know what a shark was and I showed you a picture of a shark and asked you, 'Can it swim?' Of course it can," Musgrave said. "A thousand years from now, you'd say the T-38's a classic, but it'll be beautiful then, too."

U.S. Honor Flag to fly on final shuttle mission

By Cheryl Mansfield
Spaceport News

It's toured the country and the world to honor the dedication and sacrifice of Americans who have lost their lives serving as police officers, firefighters and military service members. Now, the U.S. Honor Flag will pay tribute to astronauts who have died in the line of duty as it flies this summer aboard space shuttle Atlantis during the shuttle program's final mission.

Begun as a tribute following the Sept. 11, 2001 terrorists attacks, the flag serves as a traveling memorial to heroes who lost their lives while serving their communities and country. During a May 26 ceremony at the Kennedy Space Center Visitor Complex in Florida, the flag began its journey to space as James K. Loftus, director of the Miami-Dade Police Department, presented it to Bob Cabana, director of Kennedy Space Center.

"The flag honors all the first responders, military and now astronauts who've paid the ultimate price in service to our country. I think it's a real privilege to take it aboard Atlantis and bring it home safe," said Cabana following the ceremony.

CLICK ON PHOTO *NASA/Kim Shiflett*

James Loftus, director of the Miami-Dade Police Department; Jerry Ross, chief of the Vehicle Integration Test Office; and Bob Cabana, director of Kennedy Space Center in Florida, salute the Space Mirror Memorial at the Kennedy Space Center Visitor Complex during a U.S. Honor Flag presentation May 26. A flag that has traveled throughout the world to honor heroes who have lost their lives while serving their community and country was presented to NASA for space shuttle Atlantis' final flight, STS-135, targeted to launch in July. After the mission, the flag will continue as a traveling memorial. For more on the U.S. Honor Flag, click on the photo.

With the visitor complex's Astronaut Memorial Mirror as a backdrop, a 100-member honor guard and bagpipe procession accompanied the flag, which Cabana handed over to veteran astronaut Jerry Ross in preparation for its flight aboard Atlantis. The handoff was followed by a moment of silence at the memorial, which bears the names of astronauts who have died in the exploration of space.

The flag's tour is sponsored by the non-profit Honor Network, but began with one man and his flag, Chris Heisler. Shortly after the Sep. 11attacks, an American flag from the Texas House of Representatives was given to Heisler, who decided to take the flag to Ground Zero at the World Trade Center site. His flag flew over Ground Zero for two weeks, and the U.S. Honor Flag was born.

"When we took the flag to Ground Zero, we had officers from all over the country, and firefighters. Since then, the flag has been to more than 1,000 different events and has truly become a piece of American history and a national treasure that is safeguarded and protected," says Heisler, "But we had no anticipation that the flag would go from there to NASA, aboard the space shuttle and to the International Space Station."

"When this flag comes back from space and goes to the next funeral for the next family," he explains, "it's the little boys and girls whose mother or father made the ultimate sacrifice who will see that flag there memorializing their parent and they'll know that all that history of all these heroes is embedded with their father or mother, so that history continues."

Atlantis' STS-135 mission to the International Space Station will be the last for the Space Shuttle Program.

Students dig sandbox challenge at Lunabotics Mining Competition

By Linda Herridge
Spaceport News

Undergraduate and graduate students from more than 30 universities and colleges in the U.S. and five other countries are digging in the dirt in a supersized sandbox filled with a crushed basalt that has similar characteristics as lunar soil, called BP-1, at NASA's second Lunabotics Mining Competition at the Kennedy Space Center Visitor Complex.

The teams arrived Monday and Tuesday to set up their remote-controlled Lunabots and put them through communication checks and practice runs to prepare for the official competition, which began May 26, and continues through May 28.

Using computer-controlled commands, the teams are competing against each other to see who can maneuver their Lunabot through the rough terrain, collect and then deposit the most BP-1 within 15 minutes.

During the opening ceremony Thursday, Kennedy Engineering Director Pat Simpkins said it was great to see so many teams competing this year, including those from other countries.

"You are paving new frontiers here," Simpkins said. "I'm excited to see what you are doing."

NASA's Education Lead for the Exploration Systems Mission Directorate Jerry Hartman said the agency is becoming all about international activities.

"I'm pleased we have international participation in the Lunabotics competition," Hartman said. "Life is too short to do something you don't enjoy. Go forth and do great things."

Rob Mueller is chief of surface systems in the Engineering Directorate and serves as the head judge for the competition. He introduced 13 judges representing

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CLICK ON PHOTO *NASA/Jack Pfaller*

University students prepare their remote controlled or autonomous excavator, called a lunabot, in a tent next to the "Lunarena" at the Kennedy Space Center Visitor Complex. Forty-six teams of undergraduate and graduate students from the United States, Bangladesh, Canada, Colombia and India participated in NASA's Lunabotics Mining Competition May 26-28. The competition is designed to engage and retain students in science, technology, engineering and mathematics (STEM). For more about the Second Annual Lunabotics Mining Competition, click on the photo.

Scenes Around Kennedy Space Center

CLICK ON PHOTO *NASA/Frankie Martin*

Fifty-nine students ages 16 through 18 from Freedom and East River high schools in Orlando, Fla., participate in an education event May 12 in honor of National Lab Day at the Space Life Sciences Laboratory on Kennedy Space Center. The students experienced hands-on activities in polymer, microbiology, materials failure analysis and more. They also conducted a balloon experiment under the direction of Space Florida. Through events such as these, NASA strives to inspire and engage students in science, technology, engineering and mathematics, or STEM, education while building a future work force skilled in these disciplines. To find out more about Kennedy's commitment to education, click on the photo.

CLICK ON PHOTO *NASA/Jack Pfaller*

Technicians lift one of two spacecraft for NASA's Gravity Recovery and Interior Laboratory, or GRAIL, to a test stand in the Astrotech payload processing facility in Titusville, Fla., on May 21. The United Launch Alliance Delta II rocket that will carry GRAIL into lunar orbit already is fully stacked at NASA's Space Launch Complex 17B and launch is scheduled for Sept. 8. For more on GRAIL, click on the photo.

CLICK ON PHOTO *NASA/Kim Shiflett*

The first stage for an Atlas V rocket arrives May 24 in the Atlas Spaceflight Operations Center at Cape Canaveral Air Force Station. The United Launch Alliance rocket is slated to launch NASA's Juno spacecraft to Jupiter from Cape Canaveral, Fla., on Aug. 5. The solar-powered spacecraft will orbit Jupiter's poles 33 times to find out more about the gas giant's origins, structure, atmosphere and magnetosphere. To follow the spacecraft team on Twitter, click on the photo.

CLICK ON PHOTO *NASA/Jim Grossmann*

An overhead crane lowers the Lightweight Multi-Purpose Experiment Support Structure Carrier, or LMC, into a payload canister in the Space Station Processing Facility on May 23. The canister then will be installed into Atlantis' payload bay for the STS-135 mission to the International Space Station. STS-135, the final mission of the Space Shuttle Program, is targeted to launch July 8. To learn more about the STS-135 mission and crew, click on the photo.

CLICK ON PHOTO *NASA/Gianni Woods*

Kennedy Space Center's Hispanic Outreach and Leadership Alliance (HOLA) hosts its annual Cinco de Mayo celebration on May 5 at KARS Park II. Games and dancing highlighted the event. For more on HOLA, click on the photo.

F-104 Starfighters fleet grows while 'breaking mold'

By Steven Siceloff
Spaceport News

F-104 jet fighters just like the ones astronauts trained in for decades will become a more regular part of the skyscape above Kennedy Space Center. The private company is expanding its fleet of jets with plans to conduct more research flights, launch very small satellites into space and even take paying passengers into the stratosphere.

The developments come four years after the company made its first flight from Kennedy's Shuttle Landing Facility, or SLF, in April 2007.

Starfighters pilot and owner Rick Svetkoff is one of the new generation of entrepreneurs working to open different aspects of the aerospace world to a broader group of developers, researchers and people.

"We're breaking the mold," Svetkoff said recently inside the hangar at the SLF the company leased from Space Florida.

Boasting speeds faster than Mach 2, extreme acceleration and the ability to pull 7 Gs or more, the F-104 provides a platform to test rocket components, tracking sensors and space-bound equipment, Svetkoff said. The aircraft also can push over to create microgravity conditions for a short time.

CLICK ON PHOTO *Photo courtesy of Starfighters Inc.*

Starfighters is expected to add five more aircraft to its fleet of four F-104s that fly from the Shuttle Landing Facility at Kennedy Space Center. Starfighters have been used to test high-performance equipment used on the space shuttle, telemetry equipment and a new digital camera. For more on the Starfighters, click on the photo.

"We can go from ground to 23,000 feet as fast as some of the rockets launched here," Svetkoff said.

That is an appealing combination for researchers who want to try out their designs and for passengers who want to get pushed to their own limits.

"High altitude and high speed is the key," Svetkoff said.

Svetkoff's company worked for years showing off the aircraft in air shows, where the F-104s would tear through the air over dazzled crowds. In the last four years, the company has flown microgravity experiments, spacecraft parts and a digital camera to make sure it could withstand launch conditions. For example, Space Florida and the Florida Space Grant Consortium have flown payloads using Starfighters.

There are four planes in the hangar now, three operational and one used mostly for parts. Built in the 1960s, they are sharp, sleek birds that evoke the aire of speed even at rest. But parts are hard to find, which is why Svetkoff bought five of the latest model Starfighters from Italy. With those F-104 models, the company gains long-term stability, Svetkoff said.

Researchers are developing projects using the F-104 to try out everything from space traffic control to human reactions to different physical conditions to launching satellites on quick trips into space.

"There's a lot of things that we can do out here," said Eddie Ellegood, director of Aerospace Development and a space policy analyst at Embry-Riddle Aeronauical University in Daytona Beach, Fla.

A 19-foot-long, 900-pound rocket about the size of a Sparrow missile has been developed to launch nanosatellites from a Starfighter. The concept requires the plane to fly to around 60,000 feet, about twice as high as most airliners cruise.

"That means we have to have pressure suits," Svetkoff said. "The U-2 and the F-104 used the same cockpit systems, so we can use those pressure suits in our aircraft."

The company is the only civilian operator in the world of the F-104 Starfighter, a fighter jet able to soar to about 100,000 feet. Svetkoff's fleet comes from overseas, acquired from air forces in Norway and Italy that stopped using the planes.

Designed by the legendary Kelly Johnson, the man behind the SR-71, the Starfighter was the first U.S. jet fighter to fly twice the speed of sound, a record it set in 1954. Because of its huge 11,000-pound thrust engine and stubby, seven-foot-long wings, the aircraft was known as the "missile with a man in it."

NASA used the F-104 through the 1990s as a research aircraft and chase plane. Astronauts including Neil Armstrong flew the aircraft and one of NASA's retired Starfighters hangs in the Smithsonian National Air and Space Museum in Washington, D.C.

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various NASA programs, Kennedy directorates and industry.

"Are you ready to dig?" Mueller asked the teams. "To build a robot is not easy."

The only team from a community college in the competition, Oakton Community College's team, from Des Plaines, Ill., is preparing for their turn to compete on Saturday, with their youngest team member, Owen Dudney, 7, cheering them on.

Adjunct Professor and Engineering and Physics Club Advisor George Tootelian said that a colleague at Northwestern University contacted him about a young student who was ready for some challenges. Tootelian said the team welcomed the first-grader on board. Owen helped name the Lunabot, Hope, and offered suggestions on some design aspects of the robotic excavator.

Owen's mother accompanied him to the team's planning meetings where he watched and learned as the senior students built their Lunabot.

According to Hortense Burt, chief of education programs, the event is designed to engage and retain students in the science, technology, engineering and math, or STEM, disciplines critical to NASA's mission.

"This is the first time a young student has had a key role with a Lunabotics team," said Hortense Burt, chief of Kennedy's Education Programs. "It is a perfect opportunity to mentor and encourage him and other young students in STEM fields."

Last year's winning team from Montana State University in Bozeman returned this year with eight new senior team members and an all new Lunabot, Mule 2.0.

According to Electrical Engineering Advisor Brock LaMeres, the mining competition is one of the senior design project choices at the university.

"This year's team took everything that worked from last year and built on that," LaMeres said.

"It's an incredible event. There are more robots with more functionality this year."

The Prairie View A&M University team from Houston, Texas returned to try again after last year's efforts left them unable to compete with a Lunabot that was damaged during delivery.

Dr. Paul Biney, a mechanical engineering professor, along with Technical Specialist Kevin Lee are the team's advisors. He said the team rented a truck and transported the Lunabot themselves this year.

"So far all preliminary checks are looking good," Biney said. "We have high hopes for this year."

Other elements of the competition include systems engineering papers, an outreach project, slide presentation and team spirit.

"These teams have persevered through many difficult challenges to make it to the competition," said Gloria Murphy, lead for ESMD Space Grant and the Lunabotics Mining Competition. "This experience will help the students learn how to solve complex problems when they become engineers."

Moon speech sought international cooperation in space

By Kay Grinter
Reference Librarian

CLICK ON PHOTO *NASA file/1961*

President John F. Kennedy delivered one of the most memorable speeches of the 20th Century on May 25, 1961. He challenged Congress and the American people to put a man on the moon, and return him safely to Earth, by the end of the decade. For links to full-text and audio versions of the speech, click on the photo.

The words of President John F. Kennedy 50 years ago challenged NASA and the nation to attempt what at that time was seemingly impossible to many -- human lunar exploration.

Driven to action by the Soviet Union's successful launch and Earth-orbit of Yuri Gagarin, the world's first man in space, Kennedy addressed Congress on May 25, 1961, regarding what he deemed "urgent national needs."

"I therefore ask the Congress," Kennedy said, "above and beyond the increases I have earlier requested for space activities, to provide the funds which are needed to meet the following national goals:

"I believe that this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to Earth. No single space project in this period will be more impressive to mankind or more important for the long-range exploration of space; and none will be so difficult or expensive to accomplish."

In his book "John F. Kennedy and the Race to the Moon," John Logsdon, professor emeritus of political science and international affairs at The George Washington University, points out that as a presidential candidate, Kennedy said "wherever we can find an area where Soviet and American interests permit effective cooperation, that area should be isolated and developed," and put out a call to the world leaders in his inaugural address "to explore the stars together."

Even after Kennedy outlined his space goals to Congress in 1961, he continued to hope that international cooperation was possible.

Addressing the General Assembly of the United Nations on Sept. 20, 1963, four months after NASA had accomplished its first six manned missions and the Mercury Program was concluded, Kennedy said "in a field where the United States and the Soviet Union have a special capacity -- in the field of space -- there is room for new cooperation . . . I include among these possibilities of a joint expedition to the moon."

Kennedy further asked, "Why should man's first flight to the moon be a matter of national competition? . . . Surely we should explore whether the scientists and astronauts of our two countries -- indeed of all the world -- cannot work together in the conquest of space, sending some day in this decade to the moon not the representatives of a single nation, but representatives of all our countries."

NASA file/1963

Dr. Wernher von Braun explains the Saturn launch system to President John F. Kennedy at Cape Canaveral in 1963. NASA Deputy Administrator Robert Seamans is to the left of von Braun.

At the time of his death on Nov. 22, 1963 two months later, no deal for a joint space mission had yet been made.

It was not until 12 astronauts had walked on the moon in the Apollo Program and the U.S. had demonstrated its technological prowess that the U.S. and U.S.S.R. "shook hands" in space on the joint Apollo-Soyuz Test Project, or ASTP.

Between July 17 and 19, 1975, astronauts inside an Apollo capsule orbited Earth docked to a Soyuz spacecraft, joining their cosmonaut companions in broadcasts of the interiors of the two spacecraft to an avid international audience on the planet below.

In so doing, the crews of the ASTP paved the way for the Shuttle-Mir missions to the Russian space station, the construction of a truly International Space Station, or ISS, and the mutual transport to the ISS of cosmonauts aboard the space shuttle and, in turn, astronauts aboard the Soyuz.

Kennedy's vision for international cooperation is expected to remain strong as NASA and 15 countries carry out missions aboard the International Space Station during the next decade. NASA also looks to partner with other countries to explore futher into the solar system.

Kennedy Planning Office updates workforce on partnership efforts

By Linda Herridge
Spaceport News

The status of Kennedy Space Center's emerging partnerships and what the Center Planning and Development Office (CPDO) is doing to facilitate these efforts were among the topics shared during the Kennedy Engineering Academy, or KEA, on May 26 in the Training Auditorium.

Panel members were Joyce Riquelme, CPDO manager; Tom Engler, manager of the Partnership Development Office; and Mike Vinje, partnership development manager. Vinje moderated the presentation and question-and-answer session that followed.

The presentation included CPDO's mission, which is to develop the world's premier spaceport, meeting government and commercial space industry needs, through comprehensive resource planning and the formation of partnerships to ensure the economic vitality of the center.

"Our job is to plan for Kennedy's future, find partners and secure agreements," Riquelme said. "Our biggest challenge will be to learn new ways to operate to make it easier for commercial customers to want to do business with us."

Riquelme said the office's responsibilities include serving as the center's "front door" for new business and partnerships, making the most effective use of Kennedy's underutilized capabilities, and performing centerwide planning to provide flexible capabilities for future spaceport development and to manage center agreements.

She stressed that Kennedy organizations are involved in every phase of the partnership process.

Riquelme explained that one of the challenges for the office is developing commercial pricing models for Kennedy's unique facilities and services. Many potential commercial partners have business models that differ from Kennedy's, which present challenges.

"We are working these issues," Riquelme said. "We're also working with other NASA centers to learn about their efforts and share Kennedy's efforts, and determine ways to collaborate on future partnership opportunities."

Vinje said that NASA's traditional programs, including Space Launch Systems, Launch Services Program and Multi-Purpose Crew Vehicle will continue to be the core business of Kennedy, but the office is working on commercial partnerships to expand activities and provide opportunities for growth.

"All of the commercial activities we are working to bring here are meant to augment Kennedy activities, not replace them," Vinje said.

Engler said the center has signed agreements with Zero-Gravity, Space-X, the National Reconnaissance Organization, the U.S. Department of the Interior, Rivian (formerly Avera Motors) and Starfighters.

The center also has partnered with Space Florida to create Exploration Park, which is a new "outside the gate" option for industries that may or may not be directly related to the space industry.

"As we work with companies, our main issue is responsiveness in our processes," Engler said. "Some of them don't have the time or money to wait."

Riquelme said the contractor work force is included in partnership efforts to help create jobs for those workers who are being affected by the end of the Space Shuttle Program. She also said the office investigates all suggestions of companies that may be a good fit at the center.

The office held an industry workshop in March 2010 to provide interested companies information about the CPDO and the partnership process, and followed up with a notice of availability of facilities in February 2011.

For more information on the CPDO, visit the external website at, **http://kscpartnerships.ksc.nasa.gov.**

Kennedy Space Center Calendar

* All times are Eastern

June 15	Sharon Wong, guest speaker, "Diversity, Leadership, Empowerment and Beyond" in honor of Asian-Pacific American Heritage Month; Operations and Checkout Building, Mission Briefing Room; 11 a.m. to 1 p.m.
June 16	Bonnie St. John, guest speaker, "Perseverance = Success" Spring 2011 Diversity Event; Training Auditorium; 10 a.m.
June 17	KSC B.E.S.T. BBQ; KARS I Clubhouse (Area No. 3); 3:30 to 6:30 p.m.

Looking up and ahead . . .

* All times are Eastern

Scheduled forJune 1	Landing/KSC: Endeavour, STS-134; 2:35 a.m.
No Earlier Than June 9	Launch/VAFB: Delta II, Aquarius / SAC-D Satellite; 10:20 a.m.
Targeted for July 8 Planned for July 20	Launch/KSC: Atlantis, STS-135; about 11:40 a.m. Landing/KSC: Atlantis, STS-135; about 6:15 a.m.
No Earlier Than July 14	Launch/CCAFS: Atlas V, GPS IIF-2; 2:51 p.m.
Aug. 5	Launch/CCAFS: Atlas V, Juno; 11:40 a.m.
No Earlier Than September	Launch/CCAFS: SpaceX Falcon 9, Dragon C2; TBD
Sept. 8	Launch/CCAFS: Delta II Heavy, GRAIL; 8:37 a.m. to 9:16 a.m.
No Earlier Than Oct. 8	Launch/CCAFS: SpaceX Falcon 9, Dragon C3; TBD
Oct. 25	Launch/VAFB: Delta II Heavy, NPP; 5:47 to 5:57 a.m.
No Earlier Than Nov. 25	Launch/CCAFS: Atlas V, Mars Science Laboratory; 10:21 a.m.

John F. Kennedy Space Center

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